Travel Time Reliability

The Intricate Math Of A Predictable Commute

For most people, the only thing worse than a congested commute is an unpredictable one.

Someone who has a consistent 45-minute commute has what you would call a reliable commute, as long as the daily travel time doesn't vary beyond what they consider reasonable. But someone who never knows from day to day whether it will take 30 minutes or an hour has an unreliable commute. That uncertainty prompts people to pad their commute time. Traffic planners call that padding "Buffer Time," the time one must add to reach their destination as planned.

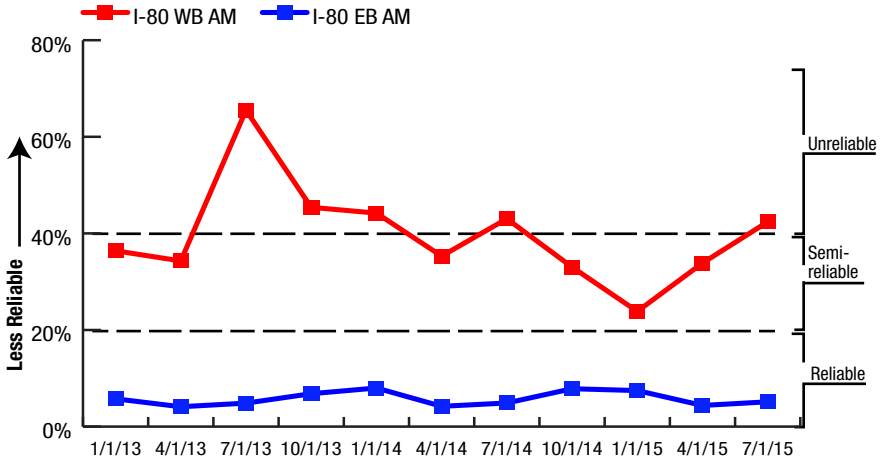
Measuring and calculating that "Buffer Time" creates what is called a "Buffer Time Index." Caltrans uses this index to identify which corridors require assistance in smoothing out delays and helps us measure the effectiveness of our solutions.

The Department divides the Buffer Time Index into three levels of travel time reliability:

- Reliable travel means drivers need to add less than 20 percent travel time to the average trip to get to their destination on time 95 percent of the time. For example, on a 45-minute commute, drivers would need to pad their commute by nine minutes or less.
- Moderately unreliable travel requires drivers to add 20 to 40 percent of travel time to get there on time 95 percent of the time (padding their commute by as much as 18 minutes in a 45-minute commute).
- Unreliable travel means drivers must add more than 40 percent of travel time to get there on time 95 percent of the time (padding their commute by more than 18 minutes in a 45-minute commute).

Travel Time Reliability on Contra Costa/Alameda I–80

Morning Commute 5 a.m. – 10 a.m.

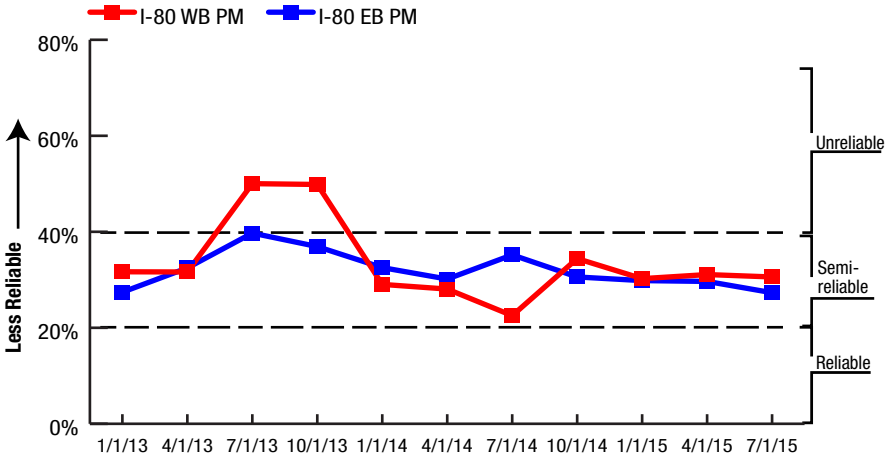


This chart shows morning travel time reliability for both directions on the Contra Costa/Alameda Interstate 80 corridor. Westbound morning commutes (dark red line) ranged from unreliable to semi-reliable. Heading the opposite direction in the morning (blue line) was consistently reliable in the time period displayed.

Note: Collisions, construction projects, weather, and events affect travel time reliability. In 2013, Caltrans had 211 projects in construction in the Bay Area, with the new Bay Bridge opening in September 2013.

Travel Time Reliability on Contra Costa/Alameda I–80

Evening Commute 3 p.m. – 8 p.m.



This chart shows evening travel time reliability for both directions on the Contra Costa/Alameda Interstate 80 corridor.

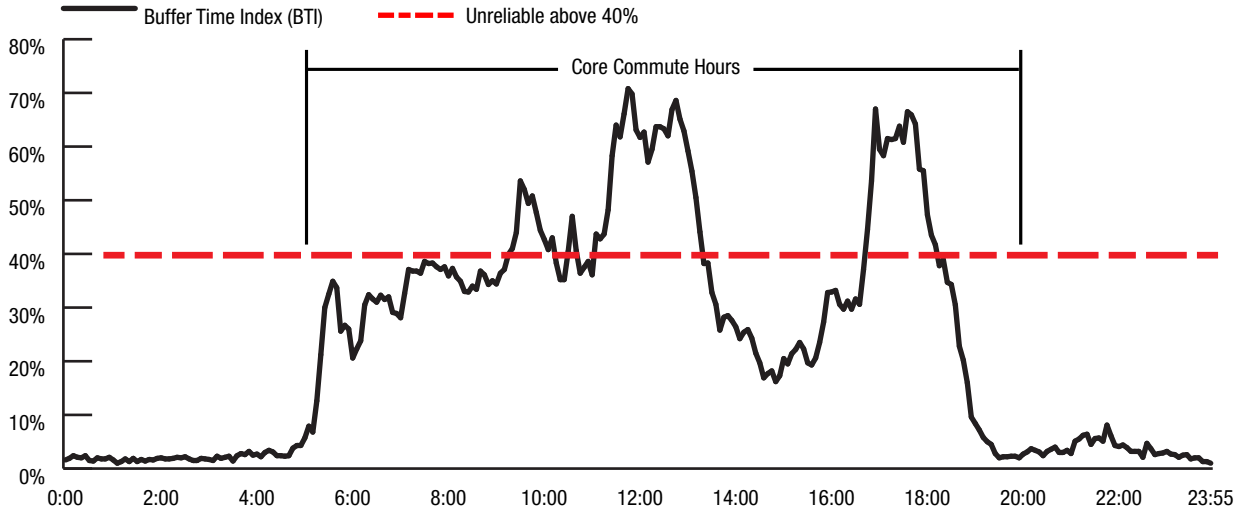
Caltrans' 2015-2020 Strategic Management Plan has a goal to increase corridor reliability. The department aims to improve reliability by one level on four corridor commute directions, one each for State Route 57, Interstate 110, Interstate 80 and Interstate 210. Caltrans has been measuring reliability in urban corridors consistently since 2013, and the graphs on these pages show the reliability of the morning and evening commutes for one particularly busy corridor: Interstate 80 in the East Bay Area (District 4).

Buffer Time Index

Caltrans uses its own performance measurement software to provide statewide information about vehicle travel time, traffic counts and other data to pinpoint where travel time reliability needs improvement. The data that is sent to the Caltrans Performance Measurement System comes from sensors under the pavement or near the roadway in most urban areas. Information is also sent to staff at Caltrans' traffic management centers (TMCs) throughout the state to alert them of problems. The TMC staff can also see what is going on using closed-circuit cameras. This helps them quickly deal with problems that block traffic. The less time it takes to clear the roadway, the sooner traffic flow returns to normal.

Buffer Time Index
Contra Costa/Almeda I–80 Westbound

April 1, 2015–June 30, 2015



The BTI (Buffer Time Index) represents the amount of time motorists must add to their average commute to get to their destination when planned. This graph shows the BTI on I-80 in Alameda and Contra Costa counties at different times of the day. When using I-80 in these counties, motorists need more time during the unreliable morning and evening commute and in some congested corridors, during the lunchtime hour.

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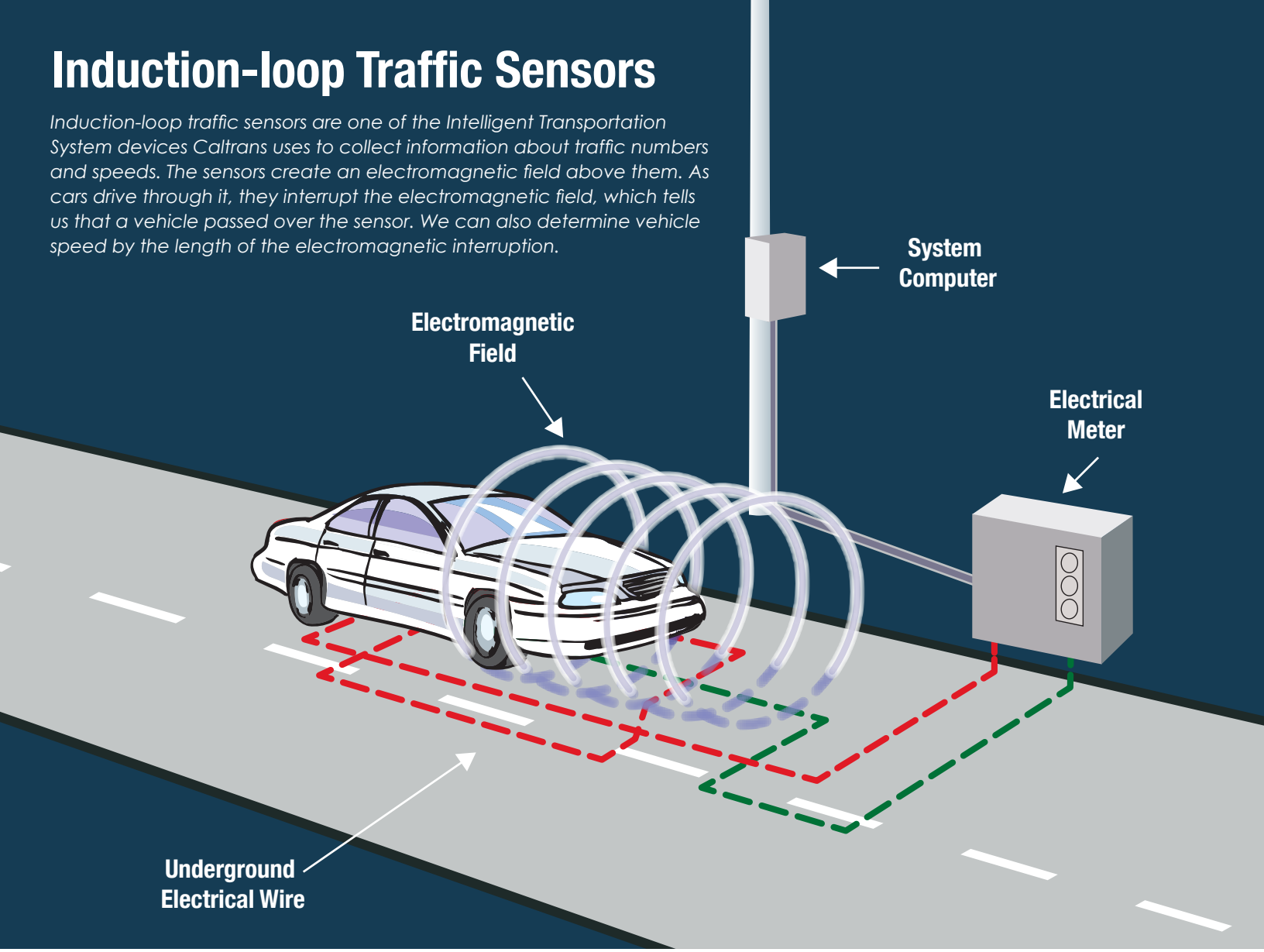
Induction-loop Traffic Sensors

Induction-loop traffic sensors are one of the Intelligent Transportation System devices Caltrans uses to collect information about traffic numbers and speeds. The sensors create an electromagnetic field above them. As cars drive through it, they interrupt the electromagnetic field, which tells us that a vehicle passed over the sensor. We can also determine vehicle speed by the length of the electromagnetic interruption.



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Traffic Sensors

Induction-loop traffic sensors are one of the Intelligent Transportation System devices Caltrans uses to collect information about traffic numbers and speeds. The sensors create an electromagnetic field above them. As cars drive through it, they interrupt the electromagnetic field, which tells staff that a vehicle passed over the sensor. Vehicle speed can also be determined by the time it takes for a vehicle to travel across two sensors.

However, it takes time, money and coordination to improve travel time reliability throughout the state. Caltrans is constantly repairing its intelligent transportation system elements like highway detectors, traffic signals and electronic message signs which fail or become obsolete over time. This process often requires coordination with regional transportation agencies, cities, counties, Native American tribes and bordering states.

In 2007, Caltrans partnered with local agencies to build a network of integrated electronic signs, ramp meters and other state-of-the-art elements on I-80 between the Carquinez Bridge and the Bay Bridge. Starting in the spring of 2016, this I-80 SMART Corridor will be able to relay real-time traffic information to motorists so they can make informed travel decisions. This will improve motorists' safety and travel time reliability. (See I-80 SMART Corridor article in the 3rd Quarter 2015 Mile Marker). Improvements in the State Route 57, Interstate 110, and Interstate 210 corridors are in the design phase (or being developed collaboratively with our transportation partners).

Caltrans is also collaborating with dozens of regional and local agencies to better manage highly congested and unreliable corridors throughout the state, including the "Connected Corridors" pilot project on Interstate 210 in the San Gabriel Valley, Los Angeles County (District 7). These Connected Corridors will lay the groundwork for similar efforts statewide.

Source: Division of Traffic Operations
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